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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,270	09/17/2003	Chris Kaminski	45896.0022	8659

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Oyen Wiggs Green & Mutala
The Station
Suite 480
601 West Cordova Street
Vancouver, V6B 1G1
CANADA

EXAMINER	
GRANT, ROBERT J	
ART UNIT	**PAPER NUMBER**
2838	

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/667,270	KAMINSKI ET AL.
	Examiner	Art Unit
	Robert Grant	2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,18-25 and 27-30* is/are rejected.

7)☒ Claim(s) *17,26 are,31-33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 18-23 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torii et al. (US 6,147,499) in view of Harvey (US 6,094,053).

As to Claim1, Torii discloses A cell voltage monitoring device for monitoring respective cell output voltages of a stack of series-connected cells (figure 1), each cell having a positive output terminal and a negative output terminal, said cell voltage monitoring device comprising a plurality of differential amplifiers (seen in figure 1) wherein: (a) each differential amplifier corresponds to a cell within the stack and has a first input connected to the positive output terminal of the corresponding cell and a second input connected to the negative output terminal of the corresponding cell (column 4, lines 1-2); (b) each differential amplifier has a negative supply terminal and a positive supply terminal (Elements Vcc and Gnd are seen in figure 1 connected to the positive and negative ground terminals, respectively); (c) the plurality of differential amplifiers is divided into groups, each group corresponding to a set of series- connected cells within the stack (Figure 1, 5-1 and 5-n); Torii additionally discloses where each group of differential amplifiers positive supply terminals of each differential amplifier is

connected with to a common power source (Element Vcc). And within each group of differential amplifiers, the negative supply terminal of each differential amplifier is connected to a common ground (Element Gnd). Torri does not expressly disclose powering the differential amplifiers using the cells in the stack. Harvey teaches monitoring a battery using the battery as the power source for the monitoring device (Figure 2). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Harvey with the battery monitoring circuitry of Torii and attach the positive supply terminals to the most positive terminal of the stack of cells and attach the negative supply terminal to the most negative terminal of the stack of cells, such as Harvey does to provide a battery monitoring system without the need for an outside power source.

As to Claim 2, Although Torii in view of Harvey do not explicitly disclose that the corresponding set of series-connected cells is greater than the minimum required voltage of each differential amplifier, it is the examiner's position that Harvey's battery supplies an inherently greater voltage than the minimum required voltage of the battery monitoring module so that the module can function. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the battery so that it provides sufficient voltage to power the differential amplifier.

As to Claim 3, Although Torii in view of Harvey do not explicitly disclose that the corresponding set of series-connected cells is less than the maximum allowable supply voltage of each differential amplifier, it is the examiner's position that Harvey's battery supplies inherently less than the maximum allowable voltage to the battery monitoring module so that the module can function and not be destroyed. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the battery so that it's output voltage is less than the maximum voltage allowable by the differential amplifier so that the differential amplifiers will not get destroyed by the batteries voltage.

As to Claim 4, Although Torii in view of Harvey do not explicitly disclose that the differential amplifier has a gain such that the maximum expected voltage output of the differential amplifier is less than its maximum voltage output capability, it is the examiner's position that Torii's differential amplifiers inherently must have an expected maximum output which is less than the maximum output capability of the differential amplifier so that the output would be an accurate representation of the actual voltage. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the monitoring system such that the maximum expected output of the differential amplifier was lower then the maximum capable output of the differential amplifier so that output of the differential amplifier is accurate even if the output is greater than the maximum expected output.

As to Claim 18, Torii discloses a method of monitoring respective cell voltages of a stack of series-connected cells, each cell having a positive output terminal and a negative output terminal (seen in figure 1), comprising the steps of: measuring the respective cell voltages using a plurality of differential amplifiers, each differential amplifier corresponding to a cell within the stack (column 4 lines 1-2). Torii does not expressly disclose powering the differential amplifiers using only cells within the stack. Harvey teaches monitoring a battery using the battery as the power source for the monitoring device (Figure 2). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Harvey with the battery monitoring circuitry of Torii and attach the positive supply terminals to the most positive terminal of the stack of cells and attach the negative supply terminal to the most negative terminal of the stack of cells, such as Harvey does to provide a battery monitoring system without the need for an outside power source.

As to Claim 19, which is dependent upon claim 18, further comprising the step of dividing the plurality of differential amplifiers into groups, each group corresponding to a set of series-connected cells within the stack, and wherein each group of differential amplifiers is powered using only the set of series-connected cells corresponding to that group (As previously rejected in the claim which this one is dependent upon, Torii in view of Harvey disclose this further limitation).

As to Claim 20, Although Torii in view of Harvey do not explicitly disclose the battery monitor further comprising, with respect to the dividing of the plurality of differential amplifiers into groups, the step of selecting a number of differential amplifiers for each group such that the sum of the minimum expected output voltages of the set of series-corrected cells corresponding to that group is greater than the minimum required supply voltage of each differential amplifier within the group, it is the examiner's position that Harvey's battery supplies an inherently greater voltage than the minimum required voltage of the battery monitoring module so that the module can function. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the battery and monitoring system such that the number of differential amplifiers selected can be sufficiently powered by the battery

As to Claim 21, Although Torii in view of Harvey do not explicitly discloses the battery monitor further comprising, with respect to the dividing of the plurality of differential amplifiers into groups, the step of selecting a number of differential amplifiers for each group such that the sum of the maximum expected output voltages of the set of series-connected cells corresponding to that group is less than the maximum allowed supply voltage of each differential amplifier within the group, it is the examiner's position that Harvey's battery supplies inherently less than the maximum allowable voltage to the battery monitoring module so that the module can function and not be destroyed. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the battery and monitoring system such that the sum of the cells

voltage is less then the maximum allowable voltage that can be supplied to the differential amplifiers, this way the differential amplifier will not get destroyed by the batteries voltage.

As to Claim 22, Although Torii in view of Harvey do not explicitly disclose the battery monitor further comprising, with respect to the differential amplifiers, the step of selecting only differential amplifier circuits having a sufficiently low gain such that the maximum expected output of each differential amplifier is less than its maximum output capability, it is the examiner's position that Torii differential amplifiers inherently must have an expected maximum output which is less than the maximum output capability of the differential amplifier so that the output would be an accurate representation of the actual voltage. It would have been obvious to a person having ordinary skill in the art at the time of this invention to design the monitoring system such that the maximum expected output of the differential amplifier was lower then the maximum capable output of the differential amplifier so that output of the differential amplifier is accurate even if the output is greater than the maximum expected output.

As to Claim 23, which is dependent upon claim 19,Torii in view of Harvey disclose the battery monitor further comprising the step of converting the outputs of the differential amplifiers to a common reference ground (Harvey figure 2, element 38, The analog to digital convert needs to have a reference ground so as to know the actually voltage across the stack of cells, it is necessary to have a common ground because the cells on

the top of the stack will show a voltage of the sum of all cells beneath them since they are serially connected) Therefore it would have been obvious to have the output of the differential amplifiers in Torii's battery monitor be compared to a common reference ground voltage of the stack which they are monitoring.

As to Claim 28, which is dependent upon claim 23, Torii in view of Harvey disclose the battery monitor further comprising, prior to the conversion step, digitizing the outputs of the differential amplifiers to provide a digital output for each group of differential amplifiers (Torii figure 2, Element 3), and wherein the conversion is achieved by passing the digitized outputs through digital isolators (Harvey Figure 2, element 44).

As to Claim 29 Torii in view of Harvey discloses all the limitations of claim 23. They do not expressly disclose the battery monitor further comprising, with respect to the dividing of the plurality of differential amplifiers into groups, the step of minimizing the number of groups, in order to reduce the number of isolators required to convert the outputs of the differential amplifiers to a common reference ground. It would have been obvious to a person having ordinary skill in the art at the time of this invention to create fewer stacks of cells in order to minimize the number of groups and thereby reduce the number of isolators needed in order to reduce the size and cost of the battery monitor.

As to Claim 30,which is dependent upon claim 23, Torii in view of Harvey's battery monitor further comprising the step of processing the converted outputs through a CPU to determine the cell voltages (Harvey figure 1, element 30).

Claim Rejections - 35 USC § 103

3. Claims 5,6, 9-16, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torii in view of Harvey as applied to claims 1 and 23 above, and further in view of Harris et al. (US 6,798,312).

As to Claim 5, which is dependent upon claim 1 wherein, Torii in view of Harvey further discloses outputs from the differential amplifiers are to a common reference ground (Harvey figure 2, element 38, The analog to digital convert needs to have a reference ground so as to know the actually voltage across the stack of cells, it is necessary to have a common ground because the cells on the top of the stack will show a voltage of the sum of all cells beneath them since they are serially connected). Torii in view of Harvey do not disclose the differential amplifiers are connected through isolator input circuitry to the inputs of corresponding isolators. Harris teaches the benefits of using an isolator in an electrical circuit (column 1, lines 19-22). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Harris's isolator with Torii in view of Harvey's monitoring circuit to provide protection and noise reduction.

As to Claim 6, which is dependent upon claim 5, Harris further discloses the benefits of analog isolators (Column 2, lines 64-67 and Column 3 lines 1-6).

As to Claim 9, which is dependent upon claim 6, Torii in view of Harvey in further view of Harris disclose wherein the isolator input circuitry comprises direct connections between the output of each differential amplifier and the input of the corresponding isolator (Figure 1 of Torii show the output of the differential amplifier, with Harris's teaching the output would be connected to his isolator in order to provide protection and noise reduction).

As to Claim 10, which is dependent upon claim 6, further comprising an analog-to-digital converter (Harvey figure 2 element 38) connected to the outputs of the isolators for digitizing the outputs of the isolators (It would have been obvious at the time of this invention to include an analog to digital converter after the isolator for the benefits of creating a digital signal for a microprocessor to read, element 40 of Harvey).

As to Claim 11 The cell voltage monitoring device of claim 5, wherein the isolators are digital isolators (Harvey figure 2 element 44).

Claim 12 The cell voltage monitoring device of claim 11, wherein each of the isolators corresponds to one of the groups of differential amplifiers (Harvey figure 2, a battery consists of one or more cells, therefore using Torii's method of cell monitoring in

conjunction with Harvey's battery that powers the monitoring device yields the differential amplifiers are powered by the group of cells (battery), and then outputs from the differential amplifier gets inputted into an analog to digital converter) and wherein the isolator input circuitry(element 44) comprises an analog-to-digital converter(element 38) connected between the input of each isolator and the outputs of all differential amplifiers within the corresponding group (The outputs of all of Torii's differential amplifiers in a group will be connected to one isolator for that group), for digitizing the outputs of the differential amplifiers of the group (Harvey Figure 2, element 38) and passing a digitized output to the isolator (Harvey figure 2, element 44).

As to Claim 13, which is dependent upon claim 12, Torii in view of Harvey disclose wherein the analog-to-digital converter for each group of differential amplifiers is voltage referenced to the potential of the most negative output terminal of the corresponding set of series-connected cells (Harvey Figure 2, element 38, The analog to digital convert needs to have a reference ground so as to know the actually voltage across the stack of cells, it is necessary to have a common ground because the cells on the top of the stack will show a voltage of the sum of all cells beneath them since they are serially connected).

Claim 14, The cell voltage monitoring device of claim 5, wherein the output of each isolator(element 44) is connected via CPU input circuitry (Figure 1, element 28) to a CPU (element 30) for determining the overall cell output voltages (Column 3, lines 3-5).

Claim 15 The cell voltage monitoring device of claim 14, further comprising circuitry for signaling the CPU when the corresponding stack or group voltage falls below a predetermined threshold (Column 4, lines 55-59).

Claim 16 The cell voltage monitoring device of claim 14, further comprising software for comparing the corresponding stack or group voltage against expected values (The Central controller must use software of some kind, Column 3 lines 66-67 and column 4 lines 1-9).

As to Claim 24, Torii in view of Harvey disclose the limitations of claim 23, They do not discloses wherein the conversion is achieved by passing the outputs of the differential amplifiers through analog isolators. Harris teaches the benefits of using an analog isolator in an electrical circuit (column 1, lines 19-22, and column 2 lines 64-67 and column 3 lines 1-6). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Harris's analog isolator with Torii in view of Harvey's monitoring circuit to provide protection and noise reduction.

Claim Rejections - 35 USC § 103

4. Claims 7,8, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torii in view of Harvey in view of Harris as applied to claims 6 and 24 above, and further in view of Kagan et al. (US 6,735,535).

As to Claim 7, which is dependent upon claim 6, Torii in view of Harvey in view of Harris disclose wherein each of the isolators corresponds to one of the groups of differential amplifiers (as seen in previously rejected claim 5). Torii in view of Harvey in view of Harris do not expressly discloses wherein the isolator input circuitry comprises an analog conditioner connected between the input of the isolator and the outputs of all the differential amplifiers in the corresponding groups for reducing the number of differential amplifier outputs in each group that require isolation. Kagan teaches of conditioning the analog signal so as to be able to input multiple voltages into an analog conditioner, and have to signals get sent out one at a time (Column 3 lines 1-23). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Kagan with the battery monitoring system of Torii in view of Harvey in further view of Harris in order to reduce the number of isolators by adding an analog conditioner to control the output of signals to the isolator.

As to Claim 8, Torii in view of Harvey in view of Harris in view of Kagan discloses all the limitations of claim 7, wherein each analog conditioner passes to its corresponding isolator the maximum and minimum outputs of the outputs of its corresponding group of

differential amplifiers (The analog condition of Kagan pass the maximum and minimum signals through, as well as any in between signals).

As to Claim 25, which is dependent upon claim 24, Torii in view of Harvey in view of Harris discloses all the limitations of the dependent claim. Torii in view of Harvey in view of Harris do not expressly disclose the battery monitor further comprising, prior to the conversion step, analog conditioning of the outputs of the differential amplifiers to reduce the number of outputs to convert to the common reference ground. Kagan teaches of conditioning the analog signal so as to be able to input multiple voltages into an analog conditioner, and have to signals get sent out one at a time (Column 3 lines 1-23). It would have been obvious to a person having ordinary skill in the art at the time of this invention to combine the teachings of Kagan with the battery monitoring system of Torii in view of Harvey in further view of Harris in order to reduce the number of isolators by adding an analog conditioner to control the output of signals to the isolator, which as the common ground reference as seen in claim 23 which this claim is dependent upon.

Claim Rejections - 35 USC § 103

5. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Torii in view of Harvey in further view of Kagan.

As to Claim 27, which is dependent upon claim 24, Torii in view of Harvey do not expressly disclose the monitoring device further comprising the step of digitizing the

output of the analog isolators. Kagan teaches the benefits of digitizing an output (Kagan Column 3, lines 23-27). It would have been obvious to a person having ordinary skill in the are at the time of this invention to combine the teachings of Kagan with the battery monitor of Torii in view of Harvey and convert the analog signal into a digital signal so that the signal can be used by a digital device which can perform calculations and comparisons on the value.

Allowable Subject Matter

6. Claims 17, 26, 31-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter: Claims 17 and 31-33 recite, inter alia, a cell voltage monitoring system where the system rejects overall cell output voltages when the corresponding stack or group voltage is not within an acceptable range. The art of record does not disclose nor would it have been obvious at the time of this invention to modify the art of record to create this invention.

Claim 26 recites, inter alia, a battery monitoring system wherein the output of the differential amplifiers for a group of cells all connect to an analog isolator, and the analog isolator passes only the maximum and minimum outputs of the differential

amplifiers. The art of record does not disclose nor would it be obvious at the time of this invention to modify the art of record to create this invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Grant whose telephone number is 571-272-2727. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on 571-272-2084. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RG

3/31/05

MICHAEL SHERRY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800